Cation Exchange capacity of phosphoric acid and lime stabilized montmorillonitic and kaolinitic soils

Abstract

Studies on the chemically stabilized soils have shown that the effectiveness of treatment is largely dependent on soil's natural environment. In this research, the time-dependent changes induced in permanent cation exchange capacity of lime and phosphoric acid treated soils, comprised mainly of montmorillonite and kaolinite minerals, were investigated. Also, in order to study the relationship between the exchange capacity and acidity/alkalinity of pore water, pH measurements were performed on cured samples. Based on the collected data, it was found that the pH of stabilized soils showed a tendency for reaching soil's natural pH with increasing curing time. In addition, the increase in number of broken bonds around the edges of soil particles and also the formation of cementitious compounds that acquired negative charges contributed to achieving higher CECp values at longer curing periods. Nevertheless, the kaolinite mineral with pH-dependent structural properties, showed a rather limited behavior in the acidic medium. From engineering point of view, the lime treated samples revealed the highest degree of improvement with an approximately ten-fold strength increase in comparison to the natural soil over an 8 months curing period.